REMARKS

The Pending Claims

The pending claims are directed to a method of polishing or planarizing a substrate with a composition comprising a silica abrasive and a liquid carrier. Claims 1 and 17-25 currently are pending.

Discussion of the Claim Amendments

Claim 1 has been amended to recite that the pH of the composition is about 7 or less. This amendment is supported by the specification, for example, at page 4, line 30, and the claims as originally filed. New claim 25 has been added to recite that the pH of the composition is 4-6. This amendment is supported by the specification, for example, at page 5, lines 5-7. No new matter has been added by way of these amendments.

Summary of the Office Action

The Office Action rejects claims 1 and 17-24 under 35 U.S.C. § 103(a) as allegedly obvious over U.S. Patent 5,340,370 (Cadien et al.) (hereinafter "the Cadien '370 patent") in view of each of U.S. Patent 5,895,509 (Ohmi et al.) (hereinafter "the Ohmi '509 patent") and U.S. Patent 4,664,679 (Kohyama et al.) (hereinafter "the Kohyama '679 patent").

Discussion of the Obviousness Rejections

As noted above, the pending claims have been rejected as allegedly obvious over the Cadien '370 patent in view of the Ohmi '509 patent or the Kohyama '679 patent. Applicants traverse these rejections.

The Cadien '370 patent generally discloses slurries useful for the chemical-mechanical polishing of thin films in integrated circuit manufacturing. In one embodiment, the Cadien '370 patent discloses a slurry for tungsten polishing which comprises an oxidizing agent and an abrasive (e.g., silica). However, as acknowledged in the Office Action, the Cadien '370 patent fails to disclose or suggest a method of polishing a substrate comprising tungsten using a silica abrasive having a total surface hydroxyl group density no greater than about 3 hydroxyl groups per nm^2, as recited in the pending claims. Indeed, the Cadien '370 patent fails to even mention the surface hydroxyl group density of the abrasive contained in the disclosed slurry, much less teach or suggest that the total surface hydroxyl group density should be less than a certain value.

While the Office Action acknowledges this deficiency in the Cadien '370 patent, the Office Action asserts that the claimed method would have been obvious to one of ordinary skill in the art at the time of invention in view of the teachings of either the Ohmi '509 patent or the Kohyama '679 patent. However, contrary to the Office Action's assertions, one of ordinary skill in the art, at the time of invention, would not have been motivated to combine the teachings of the Cadien '370 patent with the teachings of the Ohmi '509 patent or the Kohyama '679 patent without the benefit of improper hindsight. In particular, there is nothing in the Cadien '370 patent that points to its combination with the Ohmi '509 patent or the Kohyama '679 patent. Similarly, there is nothing in the Ohmi '509 patent or the Kohyama '679 patent that points to their combination with the Cadien '370 patent.

In order to set forth a *prima facie* case of obviousness based on a combination of references under Section 103(a), the Office Action must identify a "clear and particular" teaching, suggestion, or motivation to combine the references. *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999), *abrogated on other grounds* by *In re Gartside*, 203 F.3d 1305, 1316, 53 U.S.P.Q. 2d 1769, 1769-1770 (Fed. Cir. 2000); *In re Rouffet*, 149 F.3d 1350, 1357, 47 U.S.P.Q.2d 1453, 1456 (Fed. Cir. 1998); *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1051, 5 U.S.P.Q.2d 1434, 1438 (Fed. Cir. 1988). As the Federal Circuit has stated, "combining prior art references without evidence of such a suggestion, teaching or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability – the essence of hindsight." *In re Dembiczak*, 175 F.3d at 999.

Here, the Office Action asserts that one of ordinary skill in the art would have been motivated to combine the Ohmi '509 patent and the Kohyama '679 patent with the Cadien '370 patent by each patent's alleged teachings regarding the benefits realized by using an abrasive whose surface has been modified. In particular, the Office Action points to the Ohmi '509 patent's and the Kohyama '679 patent's alleged teachings regarding the lessened degree of substrate adhesion (i.e., adhesion of the abrasive to the substrate surface) observed for surface modified abrasives. However, the primary reference, the Cadien '370 patent, does not even mention the problem of abrasive adhesion to the substrate surface. Therefore, one of ordinary skill in the art, at the time of invention, would not have been motivated to look to another source, such as the Ohmi '509 patent or the Kohyama '679 patent, for a solution to a problem which the Cadien '370 patent does not identify or recognize. Indeed, the Office Action acknowledges this fact by looking only to the Ohmi '509 and Kohyama '679 patents, the secondary references, for a rationale in support of the combination proposed in the Office Action. Thus, any supposed motivation to combine the references based upon the alleged benefits of utilizing a surface-modified abrasive could only be realized once the individual

elements of the invention had been found in various references. However, such piecing together of the claimed invention merely constitutes improper hindsight reconstruction of the subject invention.

Furthermore, there is nothing within the Ohmi '509 and Kohyama '679 patents that would have "clearly and particularly" taught or suggested their combination with the Cadien '370 patent. More specifically, there is nothing within either of these references that would have motivated one of ordinary skill in the art, at the time of invention, to combine the compositions disclosed in either of the references with the tungsten polishing method disclosed in the Cadien '370 patent. Indeed, neither the Ohmi '509 patent nor the Kohyama '679 patent teach or suggest that the compositions described therein are useful in the polishing of tungsten substrates, such as those described in the Cadien '370 patent. While the Ohmi '509 patent and the Kohyama '679 patent do teach that the compositions can be used to polish semiconductor substrates, this broad similarity in subject matter between the references cannot be considered the "clear and particular" teaching, suggestion, or motivation required to combine references in support of a *prima facie* obviousness rejection. Indeed, if such a similarity were deemed sufficient, then the Ohmi '509 patent and the Kohyama '679 patent would "clearly and particularly" teach their combination with all references relating to the polishing of semiconductor substrates. However, such a result is clearly contrary to the established caselaw regarding obviousness.

In view of the foregoing, the Office Action has failed to properly identify a motivation to combine the references in the manner suggested in the Office Action. Therefore, the pending claims cannot properly be considered prima facie obvious over the cited references.

Assuming *arguendo* that the Office Action has properly established that the pending claims are *prima facie* obvious over the cited references, the claimed invention achieves unexpected results which are sufficient to rebut any such *prima facie* case. See, e.g., *In re Soni*, 54 F.3d 746, 34 U.S.P.Q.2d 1684 (Fed. Cir. 1995) (holding that a patent applicant may rebut a *prima facie* case of obviousness by showing that the claimed invention exhibits some superior property or advantage that a person of ordinary skill in the art would have found surprising or unexpected). In particular, the accompanying Rule 132 declaration of James A. Dirksen demonstrates that tungsten-containing substrates which have been polished with a composition comprising a silica abrasive having a total surface hydroxyl group density greater than 3 hydroxyl groups per nm^2 exhibit surface defectivities that are significantly greater than the surface defectivities of similar substrates which have been polished with a composition comprising a silica abrasive having a total surface hydroxyl group density less

than 3 hydroxyl groups per nm^2. For example, the Rule 132 declaration demonstrates that the surface defectivity of a substrate polished with a composition comprising a silica abrasive having a total surface hydroxyl group density greater than 3 hydroxyl groups per nm^2 is at least about 225% greater than the surface defectivity of a substrate polished with a composition comprising a silica abrasive having a total surface hydroxyl group density less than 3 hydroxyl groups per nm^2. The most striking difference in defectivities set forth in the Rule 132 declaration occurs at approximately 3 hydroxyl groups per nm^2, where the surface defectivity of the substrate polished with a composition comprising a silica abrasive having a total surface hydroxyl group density only slightly greater than 3 hydroxyl groups per nm^2 is about 600% greater than the surface defectivity of the substrate polished with a composition comprising a silica abrasive having a total surface hydroxyl group density only slightly less than 3 hydroxyl groups per nm^2. Having read the cited references, one of ordinary skill in the art at the time of invention would have found such dramatic decreases in the surface defectivities observed for substrates polished according to the claimed method both "surprising" and "unexpected."

Accordingly, even if the appealed claims are found to be *prima facie* obvious over the cited references, the present application sets forth evidence of unexpected results which are sufficient to rebut any such *prima facie* case.

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

John Kilyk, Jr., Reg. No. 30,763
LEYDIG, VOIT & MAYER, LTD.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6780
(312) 616-5600 (telephone)
(312) 616-5700 (facsimile)

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